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Export Quota Allocations, Export Earnings, and Market Diversifications

Taeho Bark
and
Jaime de Melo

Countries adopting voluntary export restraints (VERs) often choose a two-tier quota allocation system, with extra sales to the nonrestricted market at below marginal costs. One result may be the recent increase in antidumping cases.

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Countries adopting voluntary export restraints (VERs) often adopt a two-tier export quota allocation system. This system involves a "basic" allocation to the restricted market and an "open" allocation to the nonrestricted market — analogous to sales in one market financing sales in another market.

The two-tier system allows the flexibility required to diversify exports in nonrestricted markets, while fulfilling the established quota in the restricted market. This diversification exacts a cost because it results in extra sales at below marginal cost.

A rationale for pursuit of the two-tier system can be found in the recent history of VER negotiations, in which discussions of VERs between two major trading partners spread to other trading partners as well.

The recent increase in antidumping cases may in part be associated with the adoption of two-tier quota allocation systems.

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I. Introduction

Non-tariff barriers (NTBs) present a growing threat to a liberal world-trading system and slow the relocation of production of mature industries from developed to developing countries. Among NTBs, voluntary export restraints (VERs) are proliferating and constitute a major element of the "new protectionism". Besides measuring the incidence of NTBs, much research has concentrated on three aspects of VERs. The first is the welfare costs of VERs on the imposing country. What comes out of this analysis is that because the exporting country operates the VER, there is a rent-transfer from the importing country to the exporting country. In calculations of the welfare costs of protection to the importing country, the welfare costs of this rent transfer is often larger than the usual distortionary costs associated with an "equivalent" tariff.

The second area of research addresses the question of why VERs have been found so useful and enduring. The rent-transfer aspect indicates that exporting countries may prefer VERs to importing-country trade restraints. For importing countries, VERs offer advantages over alternative GATT-conformable measures like article XIX because they can be imposed quickly, lack transparency, and are therefore less objectionable than outright subsidies to the industries seeking protection (see e.g. Bhagwati (1986)).

The third area of research derives from another distinctive characteristic of VERs, namely that VERs are typically negotiated bilaterally for broadly defined product categories. These characteristics provide room to maneuver for exporting countries, yet another reason for their popularity. Thus broadly defined product categories may lead to quality upgrading, a phenomenon which has been amply documented for

differentiated products like autos. 1/ For undifferentiated products, like footwear and steel, transhipment has been observed (see e.g. Crandall (1987)). If, in addition there are low start-up costs, investment and production will shift to adjacent third countries not afflicted by VERs. Thus, the possibility to bypass trade restraints has led Baldwin (1982) to write on the "inefficacy" of trade restraints, particularly NTBs.

There is however another implication for maneuvering because negotiations involve only a few of the exporting countries trading partners. It has been repeatedly observed that export markets which are not currently part of the VER agreement often follow suit and enter into a VER agreement. This feature of bilaterally negotiated trade restraints has been documented for footwear by, among others, Hamilton (1986b) who refers to it as a "domino" effect. Exporting countries may then wish to prepare themselves for this eventuality by actively promoting export diversification towards non-restricted countries as a precautionary measure against future restrictions.

The implications of this export diversification motive have not been analyzed in the literature. In this paper, we first briefly describe in section 2 how export diversification is typically achieved. Next, in section 3, we set up a simple model that analyses the implications of the two-tier quota allocation rule described in section 2. We analyze the efficiency implications of this allocation rule, relating it to the literature on rent-seeking. We show that the two-tier allocation scheme is identical to a linking scheme where subsidies to sales in one market are financed from sales in another market. In section 4, we briefly examine alternative instruments and motivations for achieving export-

diversification. We also draw implications for policy actions by non-restricted countries and suggest that the recent increase in anti-dumping cases may be linked to this two-tier quota allocation practice.

II. Two-Tier Quota Allocation Systems

Countries wishing to take into account export volumes to nonquota markets usually rely on a combination of two criteria for the allocation of export licenses to the restricted country: (1) unit value of firm's exports in letter of credit; (2) export volumes to nonquota countries. In a previous paper, Bark and de Melo (1987), we show that taking into account unit value of firms' export is consistent with a government's objective of maximizing foreign exchange revenues and will usually lead to quality upgrading. The other criterion, export volumes to nonquota countries, is often used to encourage export diversification.

The usual practice then is to adopt a two-tier quota allocation mechanism: a "basic" allocation based on export shares to the restricted market; and an "open" allocation based on export shares to the nonrestricted market. For example, a two-tier quota allocation mechanism is among the criteria used for allocating rights to export clothing in Malaysia. 2/ Given that the multi-fiber agreement is so widespread, there is not much scope for diversification towards nonrestricted markets. Further evidence is available at the country level. Table 1 shows how Korea implemented her allocation criteria in 1985 (Rhee (1984)). What is striking is the uniformity of criteria across commodities subject to VERs. Furthermore, Rhee documents unofficial statistics by exporters' associations suggesting that the open quota is usually 15% to 20% of the total quota.

Table 1

The Export Quota Allocation System in Korea: Selected Cases as of 1984

Commodity	Country	Quota Allocation Criteria 1/ 2/	
		Basic Quota	Open Quota
Textiles	U.S.A., Canada, EC, Sweden	* last year's export volume * last year's average unit export price	* unit export price in L/C * last year's average unit export price * last year's export volume to nonrestricted countries
Silk Fabric	Japan	* last year's export volume	* last year's average unit export price
Cotton Yarn	Japan	* last year's export volume	* last year's average unit export price
Athletic Leather Footwear	U.S.A.	* last year's export volume	* unit export price in L/C * last year's average unit export price * last year's export volume to nonrestricted countries
Footwear	Great Britain	* last year's export volume	* unit export price in L/C * last year's average unit export price
Footwear	Ireland	* last year's export volume	* in the order of application
Stainless Steel Flatware	U.S.A., Benelux, Great Britain, West Germany	* last year's export volume * last year's export value	* basic quota allocation * last year's export volume to nonrestricted countries
B/W TV	Great Britain	* last year's export volume * last year's average unit export price	* basic quota allocation * last year's average unit export price * last year's export volume to nonrestricted countries
Carbon and Certain Alloy Steel Products	U.S.A.	* last year's export volume	* export volume of new commodity * small and new firms * last year's export volume to nonrestricted countries

Notes: L/C : local currency

1/ Specific weights given to each criterion vary across commodities.
2/ For all items, some portion of the basic quota licenses are transferable while the open quota licenses are not transferable.

Source: Rhee (1984).

In the remainder of the paper, we shall assume that unit export values are fixed, thereby excluding the possibility of quality upgrading. Now we shall develop the two-tier quota allocation model that corresponds to this practice and derive its export earnings and efficiency implications of such a scheme in comparison with the simple allocation based entirely on export shares to the restricted market.

III. The Model

Output is produced by identical firms in perfect competition. For simplicity assume that all output is exported. The assumption of export specialization allows us to derive efficiency implications by considering rents and producer surplus. We concentrate on the simpler (and in our view more relevant) case where firms produce at constant marginal costs on the relevant output range over which VERs apply. Indeed, it would appear that firms under most circumstances would be able to contract at constant costs. In any event, the more general case with increasing marginal costs (treated in the appendix), does not qualitatively affect our results.

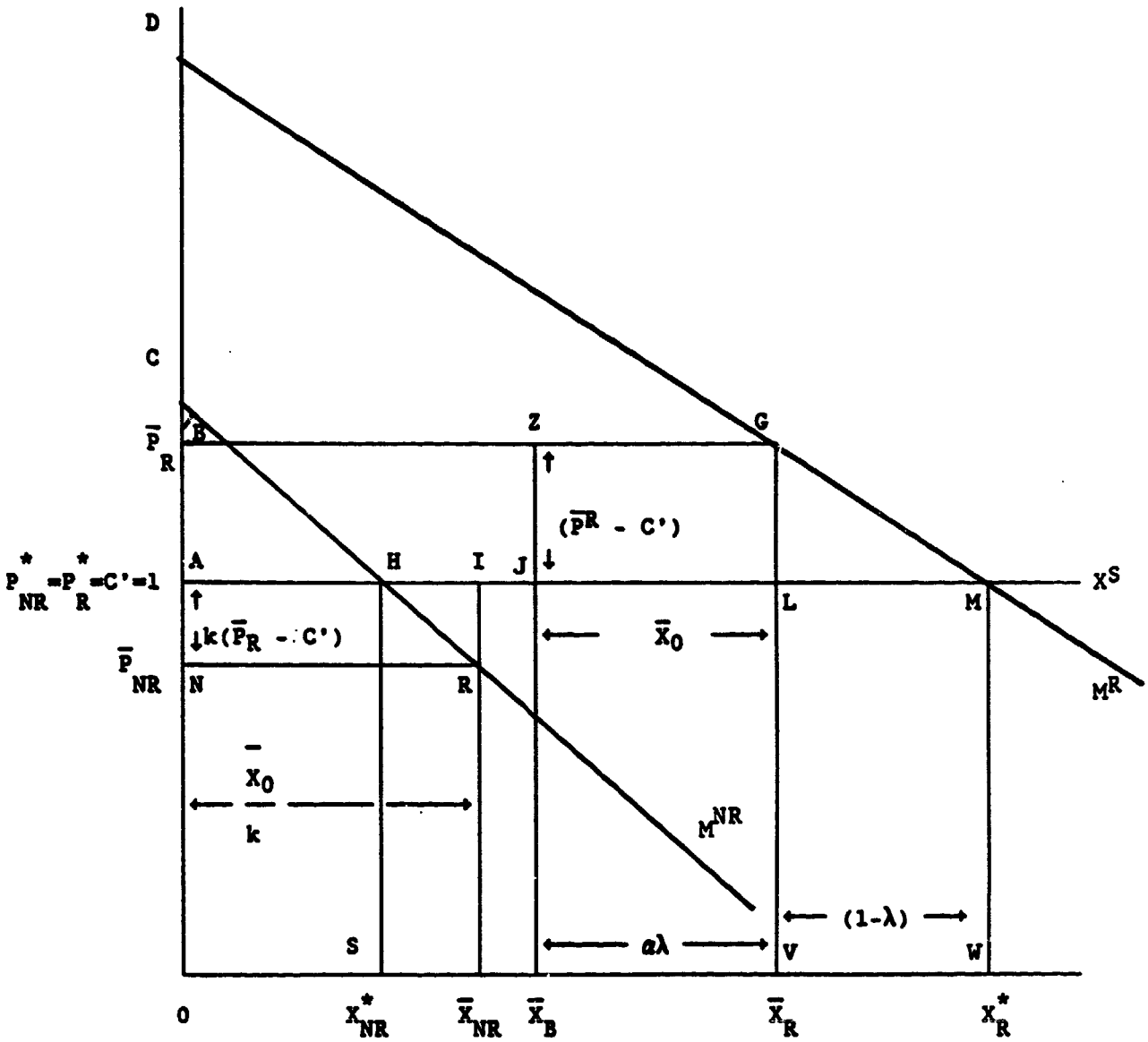
The world market for the product subject to a VER is composed of four countries: two net suppliers, one of which (the home country) negotiates a VER and two net importers, one of which (the restricting country) enters a VER with the home country. The second supplier produces a good which is an imperfect substitution for the good produced by the home country. Due to transport costs and the international law preventing transshipment, the domestic country will face a segmented market if, as is likely, export demand elasticities in the restricted and unrestricted markets are not identical.

Denote quantities and prices in nonrestricted and restricted markets by subscripts NR and R respectively. An asterisk over a variable indicates a free trade equilibrium value, and a bar a value when the VER is binding. By choice of units let $X_R^* = 1$ and $P_R^* = P_{NR}^* = 1$. Figure 1 summarizes these assumptions. The home country's export supply curve is AX^S and it faces two demand curves: DM^R in the restricted market and CM^{NR} in the nonrestricted market. Under free trade, X_{NR}^* is sold in the nonrestricted market and X_R^* in the market that will be subject to a quantitative constraint. For simplicity, assume that equilibrium quantities are sold on the elastic portions of the two demand curves and that spillover effects due to market shifts by countries not partaking in the VER negotiation are included in CM^{NR} and DM^R so that the demand curves are net demand curves.

Let negotiation of the VER between the home country and the restricting country lead to export $(\lambda \times 100)\%$ of X_R^*, so that $\bar{X}_R = \lambda$ units are shipped to the restricted market, where $0 < \lambda < 1$. As is the case in practice, the home country government administers the entry tickets (equal to λ) to the restricted market. Now suppose that the government adopts a two-tier quota allocation: Let $\bar{X}_B = \lambda(1-\alpha)$ be the "basic" allocation which is to be divided equally among firms and $\bar{X}_O \leq \bar{X}_R - \bar{X}_B = \lambda\alpha$ be the "open" allocation which is to be distributed based on each firm's export volume to the nonrestricted market, where $0 < \alpha < 1$. The allocation rule for the "open" quota is chosen such that for each unit sold in the nonrestricted market, k extra units can be sold to the restricted market. From now on, we shall assume that the quota is fulfilled, thereby ruling out the possibility that the country is losing welfare. Then, $\bar{X}_O = \bar{X}_R - \bar{X}_B$ and, as shown below, α and k cannot be chosen independently.

Figure 1

Two-Tier Quota Allocation System



Notes: Area ZGLJ = Area AIRN.

With the basic quota filled, firms choose $\bar{X}_{NR}$ to maximize profits, taking $\bar{P}_R$ and $\bar{P}_{NR}$ as given. Profits are given by:

$$(1) \qquad \pi = \bar{P}_R\bar{X}_B + \bar{P}_R\bar{X}_0 + \bar{P}_{NR}\bar{X}_{NR} - C\,[\bar{X}_B + \bar{X}_0 + \bar{X}_{NR}]$$

where C is the firm's cost function. Substituting $\bar{X}_0 = k\cdot\bar{X}_{NR}$, $\bar{X}_B = \lambda(1-\alpha)$ into equation (1) yields:

$$(1') \qquad \pi = \bar{P}_R\lambda(1-\alpha) + (k\bar{P}_R + \bar{P}_{NR})\,\bar{X}_{NR} - C[\lambda(1-\alpha) + (1+k)\,\bar{X}_{NR}]$$

Setting $\partial\pi/\partial\bar{X}_{NR} = 0$ in (1') and aggregating over firms gives the equilibrium relations between P_{NR}, P_R, and marginal cost:

$$(2) \qquad \bar{P}_{NR} = (1+k)\,C'\,[\lambda(1-\alpha) + (1+k)\,\bar{X}_{NR}] - k\bar{P}_R$$

where C' is marginal cost which, by choice of units, is assumed to be unity. Notice that $\bar{X}_{NR}$ determines $\bar{P}_{NR}$ and $\bar{X}_0$ and thus $\bar{X}_0$ together with $\bar{X}_B$ determines $\bar{P}_R$. As pointed out above, in order to satisfy both the equilibrium condition (2) and the exact fulfillment of the VER quota ($\bar{X}_0 = k\bar{X}_{NR} = \alpha\lambda$) an appropriate rate k must be chosen. Hence α and k are not independent.

From now on, assume that marginal costs are constant which corresponds to the case shown in figure 1. 3/ The analysis, in an appendix available upon request, shows that the qualitative results are unaffected by the assumption of constant instead of increasing marginal costs. Then equation (2) reduces to:

$$(2') \qquad \bar{P}_{NR} = (1+k)C' - k\bar{P}_R$$

which can be rewritten as:

$$(2'') \qquad \bar{P}_R - \bar{P}_{NR} = (1+k)\,(\bar{P}_R - C')$$

so that (1+k) is the ratio of the price wedge to the rate of quota rent. With free trade prices set to unity, (1+k) is the price wedge ratio in proportional terms. The two-tier allocation scheme is thus identical to subsidizing exports to the nonrestricted market at the rate $k(\bar{P}_R - C')$ per unit sales. This aspect of a two-tier quota allocation scheme was first noted by McCulloch and Johnson (1973) in a different context. 4/

Figure 1 shows that the two-tier quota allocation scheme shifts down and to the right the supply curve to the nonrestricted market to NR. The equilibrium under the two-tier quota allocation scheme will achieve its intended objective of market diversification: exports to the nonrestricted market increase by $\bar{X}_{NR} - X^*_{NR}$. Had the government used a "basic" allocation only for the total quota, then exports to the nonrestricted market would have remained at the free-trade level, X^*_{NR}. 5/

IV. Export Earnings and Efficiency Under a Two-Tier Quota Allocation Policy

Figure 1 will now be used to indicate the foreign exchange earnings and efficiency effects of adopting a two-tier quota allocation scheme. Consider first the case where, under free trade, the home country is operating in the elastic portion of its respective import demand curves. Hence in the restricted market there is a net foreign exchange loss since foreign exchange rents (BGLA) are less than the decline in foreign exchange

earnings (LMWV). Turning to the nonrestricted market, export earnings will rise if $\bar{P}_{NR}$ is still in the elastic portion of CM^{NR}. Next, assume that the home country is operating in the inelastic portion CM^{NR}. Then export diversification will lead to a fall in foreign exchange earnings. 6/ Since export earnings to the nonrestricted market remain unchanged under the usual single allocation system, export earnings will be higher under a two-tier allocation system provided that exports do not expand into the inelastic portion of CM^{NR}. This is likely to be the case in practice, since market shares in unrestricted markets are usually low and hence, other things equal, elasticity of demand is higher than in the restricted market.

Now consider the efficiency implications of the two quota allocation schemes. Under the single quota allocation scheme, the home country reaps quota rents yielding a welfare increase equal to BGLA. Under the two-tier allocation scheme, the home country still reaps BGLA in rents from sales in the restricted market, but incurs economic loss, AIRN, from selling at below marginal cost in the nonrestricted market. As shown below, the net gain becomes BZJA since AIRN=ZGLJ. Thus, analytically the two-tier quota allocation scheme is identical to a linking scheme where subsidies to sales in one market are financed from sales in another market.

Intuitively, competition among firms to capture the additional rents from the open quota (ZGLJ) will lead them to expand sales in the non-restricted market to the point where net gains at the margin from increased sales to the unrestricted market are zero. Marginal gains, $(\bar{P}_R - C')$, and marginal losses, $(C' - \bar{P}_{NR})$, are constant throughout. From figure 1, it can be seen that gains are given by $ZGLJ = (\bar{P}_R - C')\ k\ \bar{X}_{NR}$ and losses by $AIRN = (C' - \bar{P}_{NR})\ \bar{X}_{NR}$. Hence, net gains are given by:

$$(3) \qquad ZGLJ - AIRN = [k\,\bar{P}_R - C'(1+k) + \bar{P}_{NR}]\,\bar{X}_{NR}$$

which is equal to zero from (2)'. Thus the two-tier quota allocation scheme reduces net gains from quota rents by (α x 100) percent. Clearly this comparison of quota allocation systems indicates that there is a trade-off between efficiency and export earnings through market diversification.

The two-tier quota allocation rule leads firms to compete by selling at below marginal cost and results in a resource waste much as in the literature on rent-seeking developed by Krueger (1974) and elaborated by Bhagwati and Srinivasan (1980). Indeed, the case analyzed here, where firms sell at a loss up to the point where marginal (and total) losses are just equal to marginal (and total) rents from licenses to sell in the restricted market, is identical to the revenue seeking case analyzed by Bhagwati and Srinivasan in a different context.

Finally, for a decline in exports to the restricted market set to (λ x 100)% of X_R^*, it can be shown that (see appendix) the relationship between the basic and open quota allocation rules, namely λ, α, k is given by:

$$(4) \qquad \alpha = \frac{1}{\lambda}\, k\, \left[\left(k(1-\lambda)\, \frac{\epsilon^{NR}}{\epsilon^{R}} + 1\right)\right] X_{NR}^*$$

where ϵ^{NR} and ϵ^{R} are the positively defined elasticities of nonrestricted and restricted demand, respectively.

V. Political Economy Justification and Alternative Diversification Schemes

The above suggests that a country subject to a VER should adopt a single quota allocation system in order to maximize rent. Yet, as stated in the introduction, countries subject to VERs frequently adopt the two-tier quota allocation mechanism analyzed above. The recent history of VER negotiations suggests why this might be so. Take for example the case of footwear. Shortly after the USA negotiated its OMAS with Korea and Taiwan in June of 1976, a number of EEC and other developed countries followed suit, often extending VERs to all footwear exporters (Yoffie (1983), chp. 3 and Hamilton (1986)). If that is the case, then the home country will expect a restriction of its exports in the hitherto unrestricted market sometime in the future because of this domino effect. Then the two-tier quota allocation system provides the flexibility not available in a single quota allocation system, albeit at a cost. The government has two instruments, α and k, to reach the two targets of quota fulfillment and a desired level of export earnings in the unrestricted market. Hence it makes sense to use a two-tier allocation system to encourage export diversification early on so as to negotiate the future VER from a larger export share in the nonrestricted market. 7/

Use of a two-tier allocation system so as to negotiate a future VER from a larger share in the unrestricted market should be tempered by the possibility that selling at less than cost in the unrestricted market may provoke the importing country into imposing the VER. This introduces the question of endogenous uncertainty (see Bhagwati and Srinivasan 1976). The exporting country's government would then have to weigh the increased probability of imposition of a VER by the hitherto unrestricted market plus

the present costs of stimulating exports at a loss, on the one hand, against the expected benefits in the future of having a sizable market position if a VER were to be imposed.

What should be the specific objective of the government? At least two come to mind. One objective would consist in taking a guess at the expected future restraint rate $\phi < 1$ in the now unrestricted market and consequently expand exports in that market to $X^{*}_{NR}(1+\phi)$ so that exports after the negotiation of the VER return to their current level. Another objective would be foreign exchange earnings maximization. Then, the home country will choose $\tilde{P}_{NR}$ so that ON = NC, i.e., assuming that the country is in the elastic portion of CM^{NR}, it will export up to the point where the elasticity of demand is unity. 8/

Foreign exchange maximization may imply scarcity due to trade restrictions or a suboptimal real exchange rate. In that case an efficient allocation would occur with marginal costs and marginal revenues equated at the shadow exchange rate rather than at the official exchange rate, and the analysis would have to be amended accordingly.

Two alternative diversification schemes would have redistributive implications between exporters and the government. One scheme would be to tax exports to the restricted market while at the same time subsidizing sales to the nonrestricted market. The other scheme would involve auctioning off the export allocation rights to the restricted market at a rate that would depend on the desired level of sales to the nonrestricted market. Either approach would achieve the same diversification objective while redistributing income from exporters to the government. Furthermore, these schemes which rely on the market mechanism would have the triple advantage of: (1) allowing for ongoing trade in licenses, (which is

usually prohibited) for example by adopting a linking scheme in which exporters get titles to transferable licenses by proof of shipments to non-restricted markets; (2) providing a direct estimate of the value of the rents; (3) removing the arbitrariness associated with administratively-determined allocation criteria. However, the efficiency gains that would be associated with the alternative diversification schemes are strongly opposed by incumbent exporters who do not want to share rents with newcomer'

Two further aspects of the two-tier quota allocation system deserve mention. First, subsidizing exports to the nonr stricted market is subject to countervailing duty action according to GATT rules. Recent information on anti-dumping legislation initiated by the EC and the US indicates that anti-dumping cases have been on the rise since the early eighties, and the share of NICs in anti-dumping cases has also increased. 9/ It is quite possible that part of the recent increase in anti-dumping cases is due to the precautionary attempt at export diversification on the part of exporting countries under VERs. Second, if the wedge between the unit selling price in the restricted and non-restricted markets gets too large, there are incentives for arbitrage by, for example, violating or circumventing transhipment rules. (See Baldwin, 1982).

VI. Concluding Remarks

We have shown that a two-tier quota allocation system for export licenses to restricted markets provides the flexibility required to achieve export diversification towards nonrestricted markets while simultaneously fulfilling the established quota. But this diversification has a cost as

it results in extra sales at below marginal cost. The two-tier allocation rule thus results in a resource waste much like in the literature on rent-seeking as firms compete to obtain licenses to sell in the restricted market. A rationale for the pursuit of such a policy can be found in the recent history of VER negotiations where the bilateral negotiation of VERs between major exporters and one of their principal trading partners spreads to other trading partners as well.

In practice, the analysis should be amended in at least two respects. First if the wedge between the unit selling price in the restricted and non-restricted markets gets too large, there will be incentives to arbitrage by, for example, violating or circumventing the transshipment rule (see Baldwin 1982). Second, if a fraction of exports are domestically consumed at the price established in the nonrestricted market, export diversification will raise domestic consumer prices which will attenuate the efficiency loss from adopting a two-tier quota allocation system.

Footnotes

1/ Conditions for product mix upgrading have been analyzed by Falvey (1979) and Rodriguez (1979). Quality upgrading for automobiles and footwear have been shown by Feenstra (1984) and Aw and Roberts (1986).

2/ These two allocation criteria are found by Hamilton (1986a) in his survey of export license criteria for clothing exports among ASEAN countries subject to VERs.

3/ The analysis with increasing marginal costs is available in appendix form from the authors upon request.

4/ McCulloch and Johnson analyze the simpler case of two-tier allocation schemes for import licenses with a single market demand curve and do not have to consider tradeoffs between welfare and efficiency.

5/ This quota solution could have been achieved by an export tax to the restricted market at the rate $(\bar{P}^R - C')$.

6/ More precisely if the unit elasticity point is to the right (left) of the mid-point between H and R, foreign exchange earnings in the nonrestricted market will rise (fall).

7/ In his fascinating description of US negotiation of footwear VERs with Korea and Taiwan, Yoffie states that Korean and Taiwanese officials urged footwear producers to increase shipments to the US in early 1976 because they anticipated that a VER would soon have to be negotiated.

8/ When export earnings are maximized, the efficiency loss, α, as a portion of rents is given by the expression:

$$\frac{a^{*}(\bar{P}_{NR} - 1)\, \epsilon^{R}\, \tilde{P}_{NR}}{\lambda\,(\lambda - 1)}$$

where $\tan \beta = AH/AC = a$.

9/ Since 1980, over 300 anti-dumping cases have been initiated by both the EC and the US. The NICs share in the US and EC increased sharply in 1985 reaching 45% of all cases in both the US and the EC. We thank Patrick Messerlin for providing this information.

APPENDIX

The appendix develops the analysis for the general case where marginal costs are not constant and provides numerical simulations for selected demand and supply elasticities. As defined in the text:

1. The Model

X_R^* = free trade export level to the restricted market.

X_{NR}^* = free trade export level to the unrestricted market.

$\bar{X}_R$ = $\lambda X_R^* = \lambda$ = a VER negotiated quota to the restricted market, where $0 < \lambda < 1$.

$\bar{X}_0$ = $\alpha \bar{X}_R = \alpha\lambda$ = open quota, where $0 < \alpha < 1$.

$\bar{X}_B$ = $(1-\alpha)\ \bar{X}_R = (1-\alpha)\ \lambda$ = basic quota.

P_R^* = free trade price in the restricted market, equal to 1 by choice of units.

P_{NR}^* = free trade price in the nonrestricted market, equal to 1 by choice of units.

Two demand curves and the total cost curves are assumed to be single-valued and represented by:

(1) Nonrestricted Market's Demand Curve: $P_{NR} = \phi_N(X_{NR})$; $\phi_N' < 0$

(2) Restricted Market's Demand Curve: $P_R = \phi_R(X_R)$; $\phi_R' < 0$

(3) Total Cost Curve: $C = C(X) =; X_{NR} + X_R$; $C' > 0$; $C'' > 0$

Assume that the quota is binding. When the two-tier quota allocation is in effect, $\bar{X}_0 = k X_{NR}$, and $X = (1-\alpha) \lambda X_R^* + (1+k) X_{NR}$ where k is the number of licenses obtained per unit sold in the nonrestricted market. This linking scheme implies that marginal costs can be expressed in terms of sales to the nonrestricted market, and

$$(4) \qquad dC/dX_{NR} = (1+k) C' [(1+k) X_{NR} + (1-\alpha) \lambda]$$

Denote by a superscript asterisk the values taken by cost and demand functions under free trade and by a bar the corresponding values when the quota scheme is operating and binding. For example, $P_R = \phi_R(\lambda)$; $P_R^* = \phi_R(1)$. By choice of units, $P_R^* = P_{NR}^* = P^*$.

Firm Behavior

Identical firms are assumed to be in perfect competition. Assuming also that the basic quota is filled, firms will choose X_{NR} to maximize profits, taking P_R, P_{NR} as given. Profits are given by:

$$(5) \qquad \pi = P_R \bar{X}_B + P_R \bar{X}_0 + P_{NR} X_{NR} - C [\bar{X}_B + \bar{X}_0 + X_{NR}]$$

Substituting $\bar{X}_0 = kX_{NR}$, $\bar{X}_B = \lambda(1-\alpha)$ into equation (5), yields:

$$(5') \qquad \pi = P_R \lambda(1-\alpha) X_R^* + (kP_R + P_{NR}) X_{NR} - C [\lambda(1-\alpha) X_R^* + (1+k) X_{NR}]$$

Setting $\partial\pi/\partial X_{NR} = 0$ in (5') and aggregating over firms gives the equilibrium relation among P_{NR}, P_R, and the marginal cost:

$$(6) \qquad \bar{P}_{NR} = (1+k)\ C'\ [\lambda(1-\alpha)\ X_R^* + (1+k)\ X_{NR}] - k\bar{P}_R$$

In the case discussed in the text, the marginal cost is constant and chosen to be equal to unity, so the above relation becomes:

$$(6') \qquad \bar{P}_{NR} = (1+k)\ C' - k\ \bar{P}_R$$

which is equation (3) in the main text. Returning to the general case, exact fulfillment of the quota implies that $\bar{X}_0 = kX_{NR}$, i.e.:

$$(7) \qquad \lambda\alpha X_R^* = kX_{NR}$$

The relationship between α and k when the quota is just fulfilled can be represented in terms of the elasticities of the demand and supply curves. Linearizing around free trade equilibrium, we obtain the following expressions for $\bar{P}_R$, $\bar{P}_{NR}$, $C'\ (\bar{X}_{NR} + \bar{X}_R)$:

$$(8) \qquad \bar{P}_R = \left[(1-\lambda)\ P_R^* \ /\ \epsilon^R\right] + P_R^*$$

$$(9) \qquad \bar{P}_{NR} = \frac{(X_{NR}^* - X_{NR})\ P_{NR}^*}{X_{NR}^*\ \epsilon^{NR}} + P_{NR}^*$$

$$(10) \qquad C'\ (X_{NR} + \bar{X}_R) = \frac{(X_{NR} + \bar{X}_R - X_{NR}^* - X_R^*)}{\epsilon^S\ (X_{NR}^* + 1)} + P^*$$

where ϵ^S is the elasticity of supply and ϵ^{NR} and ϵ^R are the positively defined elasticities of nonrestricted demand and restricted demand, respectively.

Substitution of (9)-(10) into (6) after setting $P_R^* = P_{NR}^* = X_R^* = 1$ gives the following relation between α and k when the quota is just fulfilled:

$$(11) \qquad \frac{1}{\epsilon^{NR}} \left(1 - \frac{\lambda\alpha}{kX_{NR}^*}\right) + \left(\frac{1+k}{\epsilon^S}\right) \left[1 - \frac{\lambda(k+\alpha)}{k(1+X_{NR}^*)}\right] = \frac{k(\lambda-1)}{\epsilon^R}$$

In the constant marginal cost case, $\epsilon^S = \infty$, and expression (11) reduces to

$$(12) \qquad \alpha = \frac{1}{\lambda} k \left[k\ (1-\lambda)\ \frac{\epsilon^{NR}}{\epsilon^R} + 1\right] X_{NR}^*$$

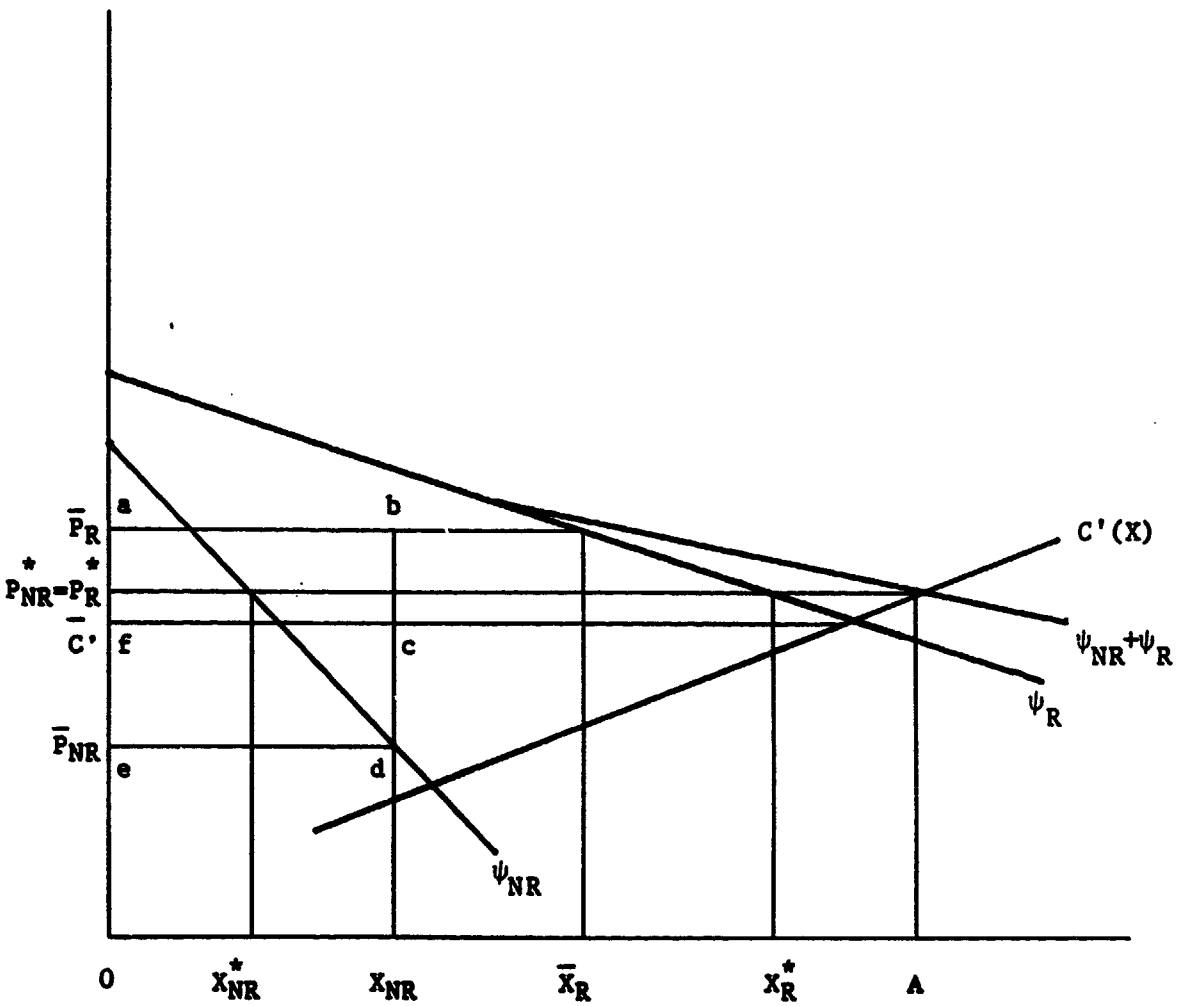
which is equation (4) in the main text.

The equilibrium for a two-tier quota allocation scheme when k=1 is illustrated in figure A1. Free trade equilibrium is at A. The value of k=1 implies that the basic quota is equal to $X_{NR}\bar{X}_R$ where $O\bar{X}_R$ is the total quota, and OX_{NR} is the open quota. At the equilibrium, the new marginal cost is $O\bar{C}'$ with value determined by equation (6') and the linking scheme insures that the value of rents associated with sales on the open quota allocation (area abcf) is equal to the value of the losses from selling in the unrestricted market at below cost (area fcde).

In the increasing cost case developed here, a two-tier quota allocation scheme will provide an indication of relative costs in the event that costs differ among producers. Allocating the "open quota" on the basis of sales in unrestricted markets favors low cost of producers. This

Figure A1

Two Tier Quota Allocation: Increasing Marginal Cost Case
(k=1)



Note: area abcf = area fcde

is in the interest of the home country since the cost of sales to restricted markets is minimized.

2. Welfare Estimates

We can now provide estimates of the welfare implications of a two-tier quota allocation scheme under different parameter values. In the absence of domestic consumption, welfare, W is measured by:

$$W = TR - TC \tag{13}$$

where:

$$TR = \bar{P}_{NR} X_{NR} + \bar{P}_R \bar{X}_R$$

$$TR = MC\ (X_{NR} + \bar{X}_R)$$

In the results reported in table A1, we assume constant elasticity demand and supply curves rather than the linearized versions appearing in equations (8) - (10). The constant elasticity curves are given by:

$$\lambda = (\bar{P}_R / P_R^*)^{-\epsilon^R} \tag{8'}$$

$$X_{NR}/X_{NR}^* = (\bar{P}_{NR}/P_{NR}^*)^{-\epsilon^{NR}} \tag{9'}$$

$$[c'(X_{NR} + \bar{X}_T)/P_R^*]^{\epsilon_S} = (MC/P_R^*)^{\epsilon^S} \tag{10'}$$

Estimates in table A1 are the result of solving equations (6'), (7), (8'), (9'), (10') and (13) for different values of the following parameters: ϵ^S, ϵ^R, ϵ^{NR}, λ, α. All computations use the following initial values:

$$P_R^* = P_{NR}^* = 1;\ X_{NR}^* = 0.5;\ X_R^* = 1.0$$

Recall that in all cases the efficiency/rent ratio is determined by the value of α which determines the share of the total quota which is linked to export volume in the nonrestricted market. As expected, the welfare gains increase with the size of the VER because the rent transfer is larger. By the same reasoning, for a given value of λ which determines the size of the quota, the welfare gain is larger, the lesser is the share of the total license sales which are linked to sales in the nonrestricted market.

Increasing the elasticities of supply and/or demand lower the welfare gains for given values of the parameters determining the total and open quotas. Referring to the Korean case discussed in section 2 where the open quota is usually set at 20 percent (α=0.2) of the total quota, a 20 percent reduction in export sales to the restricted market (λ=0.8) would result in welfare gains between 5 percent and 20 percent of total export sales, and the volume of export sales to the non-restricted market would increase between 20 and 25 percent.

Table A1

				$\alpha = 0.2$		$\alpha = 0.5$	
				$\lambda = 0.8$	$\lambda = 0.6$	$\lambda = 0.8$	$\lambda = 0.6$
$\epsilon^s = 0.5$	(a)	$\epsilon^d_R = 1$	W	0.19	0.37	0.10	0.20
		$\epsilon^d_{NR} = 2$	X_{NR}	0.65	0.81	0.69	0.88
$\epsilon^s = 0.5$	(b)	$\epsilon^d_R = 3$	W	0.06	0.11	0.03	0.06
		$\epsilon^d_{NR} = 6$	X_{NR}	0.68	0.86	0.69	0.88
$\epsilon^s = 10$	(a)	$\epsilon^d_R = 1$	W	0.16	0.32	0.10	0.20
		$\epsilon^d_{NR} = 2$	X_{NR}	0.58	0.67	0.68	0.85
$\epsilon^s = 10$	(b)	$\epsilon^d_R = 3$	W	0.05	0.09	0.03	0.05
		$\epsilon^d_{NR} = 6$	X_{NR}	0.59	0.68	0.67	0.81

Notes: $X^*_R = 1.0$; $X^*_{NR} = 0.5$ in all cases.

X_{NR} is total exports to the nonrestricted market.

References

Aw, Bee Y. and Mark J. Roberts. (1986), Measuring Quality Change in Quota-Constrained Markets: The Case of U.S. Footwear," Journal of International Economics, vol. 21, pp. 45-60.

Baldwin, R. (1982), The Inefficacy of Trade Policy, Princeton University, Frank D. Graham Lecture, Essays in International Finance No. 150.

Bark, T. and J. de Melo (1987), "Export Mix Adjustment to the Imposition of VERs: Alternative License Allocation Schemes," Weltwirtschaftliches Archiv, Band 123, pp. 668-78.

Bhagwati, J. (1986), "VERs, Quid Pro Quo DFIs and VIEs: Political Economy-Theoretic Analyses," International Economics Journal, vol. 1, No. 1, pp. 1-14.

Bhagwati, J. and T.N. Srinivasan (1976), "Optimal Trade Policy and Compensation Under Uncertainty. the Phenomenon of Market Disruption," Journal of International Economics 6:317-336.

Bhagwati, J. and T.N. Srinivasan (1980), "Revenue-Seeking: A Generalization of the Theory of Tariffs," Journal of Political Economy, pp.

Crandall, R. (1987), "The Effects of US Trade Protection for Autos and Steel," Brookings Papers on Economic Activity, pp. 271-88.

Falvey, R. (1979), "The Comparison of Trade Within Import-Restricted Categories," Journal of Political Economy, pp. 1142-65.

Feenstra, Robert C. (1985), "Quality Change Under Trade Restraints: Theory and Evidence from Japanese Autos," (mimeo), University of California, Davis.

Hamilton, C. (1986a), "ASEAN Systems for Allocation of Export Licenses Under VERs," in C. Findlay and R. Garnaut (eds.) The Political Economy of Manufacturing Protection: Experiences of ASEAN and Australia, Allen and Unwin, pp. 235-47.

Hamilton, C. (1986b), "The Rise and Fall of Footwear Protectionism," (mimeo), The World Bank, Washington, D.C.

Krueger, A. (1974), "The Political Economy of the Rent-Seeking Society," American Economic Review, pp. 291-303.

McCulloch, R. and H. Johnson (1973), "A Note on Proportionally Distributed Quotas," American Economic Review, Vol. 63, No. 4, pp. 726-32.

Rhee, S. (1984), "VERs and Improvements of the Quota Allocation System," KDI Working Paper (in Korean).

Rodriguez, C. (1979), "The Quality of Imports and the Differential Welfare Effects of Tariffs, Quotas, and Quality Controls as Protective Devices," Canadian Journal of Economics, pp. 439-49.

Yoffie, D. (1983), Power and Protectionism, Columbia University Press, New York.

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